

2837

PATENT

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P/A
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10-1-01*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the patent of: Jacobus et al.

Atty Docket No.: IMM069D

Examiner: P. Ip

Application No. 09/638,485

Filed: August 14, 2000

September 18, 2001

For: **FORCE FEEDBACK SYSTEM**

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to Commissioner for Patents, Washington, DC 20231 on 9/20/01.

Signed:

[Signature]
James R. Riegel

**CHANGE OF CORRESPONDENCE ADDRESS AND
REVOCATION AND GRANT OF POWER OF ATTORNEY**

Commissioner for Patents
Washington, DC 20231

Dear Sir:



The undersigned assignee of the entire interest in the above-referenced application hereby revokes all prior powers of attorney previously granted in connection with this application and appoints the following attorneys and agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith; said appointment to be to the exclusion of the inventor(s) and his or her (their) attorney(s) in accordance with the provisions of 37 C.F.R. 1.32:

James R. Riegel, Registration No. 36,651.

In accordance with 37 CFR 3.73, the assignee hereby certifies that the evidentiary documents with respect to its ownership have been reviewed and that, to the best of assignee's knowledge and belief, title is in the assignee seeking to take this action. Attached please find a copy of the assignment recorded on Reel 9570, Frames 0037-0050. This application is a continuation of Application No. 09/333,613, which is continuation of Application No. 09/185,301, which is listed on the assignment.

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Please change the correspondence address to the following:

James Riegel
Immersion Corporation
801 Fox Lane
San Jose, CA 95131



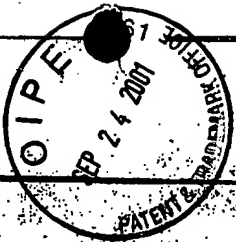
If any communications since the last correspondence from Patentee have been mailed to the previous address, Patentee hereby requests that a copy be re-mailed.

Respectfully submitted,

CYBERNET HAPTIC SYSTEMS CORPORATION

Dated: September 18, 2001

By: Vit Viegas
Victor Viegas
Vice President, Finance and Chief Financial
Officer, Cybernet Haptic Systems Corporation

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02-25-1999

SEP 2 1999 U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

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had original documents or copy thereof.

Form PTO-100 (Rev. 10-1-95)

To the Honorable Commissioner of Patent

1. Name of conveying party(ies):
Cybernet Systems Corporation
MLP
2-25-99

Additional names(s) of conveying party(ies) attached? ☐ Yes ☒ No

2. Name and address of receiving party(ies):
Name: Cybernet Rapid Systems Corporation
Address: 727 Airport Blvd.
City: Ann Arbor State/Prov.: MI
Country: US ZIP: 48108
Additional names(s) & address(es) attached? ☐ Yes ☒ No

3. Nature of conveyance:
☒ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Other
Execution Date: 2-22-99

4. Application number(s) or registration numbers(s):
If this document is being filed together with a new application, the execution date of the application is:

Patent Application No.	Filing date	B. Patent No.(s)
09/165,361	11/3/98	5,389,865 5,769,648
05/259,157	5/20/97	5,459,382 5,231,608
06/259,877	5/21/97	5,629,594 5,244,392
09/165,152	11/3/98	5,754,023 5,872,438

Additional numbers attached? ☐ Yes ☒ No

5. Name and address of party to whom correspondence concerning document should be mailed:
Name: Please give original documents to Annette Masella.
Registration No. Call her to pick up documents at
Address: 415-3060
Cybernet Systems Corporation
727 Airport Blvd.
City: Ann Arbor State/Prov.: MI
Country: ZIP: 48108

6. Total number of applications and patents involved: 12

7. Total fee (37 CFR 3.41): \$ See below
☐ Enclosed - Any excess or insufficiency should be credited or debited to deposit account
☐ Authorized to be charged to deposit account
See attached at cost letter requesting expedited assignment recordation because of infringement purposes.

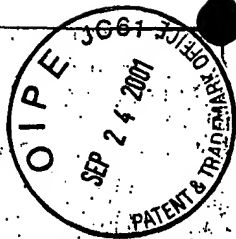
8. Deposit account number:

DO NOT USE THIS SPACE

8. Statement and signature.
To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.
Charles Jacobus
Name of Person Signing
Signature
Feb. 23, 1999
Date
Total number of pages including cover sheet, attachments, and documents: chg 480 + 120 spec

TOTAL P. 02

PATENT
REEL: 9570 FRAME: 0037



BILL OF SALE AND ASSIGNMENT

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FOR GOOD AND VALUABLE CONSIDERATION, as set forth herein, the receipt of which is hereby acknowledged, the undersigned, as Seller, does hereby grant, bargain, sell, assign, transfer and deliver to the Buyer, Cybernet Haptic Systems Corporation, a Michigan corporation, all of Seller's right, title and interest in and to the tangible and intangible personal property listed on the attached Exhibit A. Seller also hereby warrants title to the same to have and to hold the same unto the Buyer, its successors and assigns forever, free, clear and discharged of all former grants, charges, taxes, judgments, mortgages, liens and encumbrances of whatever nature.

IN WITNESS WHEREOF, the undersigned has executed this instrument this 22 day of

February, 1999.

WITNESSES:

Brenda J. Black
in full

SELLER:

CYBERNET SYSTEMS CORPORATION

By: [Signature]

Its: PRESIDENT

S:\257\CYBERNET\BOS

Exhibit A
List of Assets

US Patents

Number Issued
5,389,865 Feb 14, 1995 Method and System for Providing A Tactile
Virtual Reality and Manipulator Defining An
Interface Device Therefore

Inventors: C. Jacobus, A. Riggs, M. Taylor

Claims method and device structure allowing general purpose force feedback user input devices, like joysticks, from computer simulations. This patent describes the elements of Cybernet's original force feedback device. Innovations include:

Peak Force/Power Management

Intelligent deadman's functions (software, communications failure checking as well as user input)

Basic force feedback software systems architecture (how one structures a reactive servo system into layers, how one defines and instantiates special effects or geometrical objects in an general purposed, extensible way

Device geometry (kinematic chain) for a pistol grip sidearm stick

Some design approaches for gravity compensation

Number Issued (Continuation of above)
5,459,382 Oct 17, 1995 Method and System for Providing A Tactile
Virtual Reality and Manipulator Defining An
Interface Device Therefore

Inventors: C. Jacobus, A. Riggs, M. Taylor

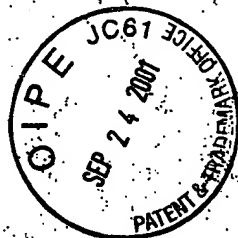
Claims the enabling software method and architecture for 5,389,865. This patent has been re-examined by the Patent Office in 1997, has been restricted in a positive way and has passed the re-examination. Re-examination certificate has issued. As a continuation, the disclosure is the same as above. Claims are structured to emphasize software architecture needed to provide generalized reactive servo system composed of active objects (which define behaviors of surfaces, 3D objects, and temporal effects). Also emphasizes architecture layers which can be partitioned between processors interconnected through communications media (wires or share memory). Restriction of claims has been in the direction of more fully defining what is meant by "generalized and extensible" representation of haptic objects or effects.

Number Issued (Reexamination Certificate for above)
B1 5,459,382 June 9, 1998 See above discussion
Inventors: C. Jacobus, A. Riggs, M. Taylor

Number Issued (Continuation of 5,389,865)
5,629,594 May 13, 1997 Force Feedback System
Inventors: C. Jacobus, A. Riggs, M. Taylor

Claims basic software method and specific hardware implementation methods derived from 5,389,865. This continuation further refines the claims derived from 5,389,865 by defining in a more complete way, what is meant by a virtual object made up of virtual surfaces. Specifically, it is made clear that this encompasses computer models typical of computer-aided design systems. It also describes how forces are superimposed from separate decomposable effects and describes further power management features for

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minimizing average power consumption while maintaining high peak forces. Identifies components of the architecture as to layer in which them are performed;

Number Issued
5,754,023 May 19, 1998 Gyrostabilized Platforms for Force
Feedback Application

Inventors: G. Roston, C. Jacobus

Claims a gyrostabilized platform architecture which allows generation of forces without direct attachment to a ground platform (table top, floor, etc.). The basic innovation here is how one can implement an impulsive force feedback device without having the device physically attached to a fixed reference frame (like a table top). The approach can implement good sports equipment or gun recoil effects with a relatively unrestricted range of motion area.

Number Issued
5,769,640 June 23, 1998 Method and System for Simulating Medical
Procedures including Virtual Reality and
Control Method and System for use Therein

Inventors: C. Jacobus, J. Griffin

Claims cover how medical image data and touch data are combined to make a force feedback or haptic medical training system. A force feedback enable endoscopic training system is disclosed in detail including:

- generation of realistic three dimensional imagery

- generation of realistic forces on instruments synchronized with the three dimensional imagery

- the mechanical architecture for a 4 degree of freedom haptic device which allows the insertion of realistic endoscopic instruments into typically three trocars

Number Issued (Continuation of 5,389,865)
5,831,408 Nov. 3 1998 Force Feedback System

Inventors: C. Jacobus, A. Riggs, M. Taylor

Additional software method claims derived from 5,389,865. Include refinement of claims for multiaxis force generation as a superposition of independent forces generated from virtual objects like surfaces or effect. Includes additional refinement of the intelligent deadman concept, and further elaborates power versus peak force control.

Number Issued
5,844,392 Dec. 1, 1998 Haptic Browsing
Inventors: T. Peurach, D. Haanpaa, T. Yocum, C. Jacobus

Claims cover the methods needed to translate three dimensional object descriptions into haptic (or force feedback) controls that simulate touching of the three dimensional objects. The complete software architecture and data object structure to implement effects and three dimensional space forms (splines, planes, conics, voxels, etc.) into a haptic system such as described in 5,389,865, 5,459,382, and 5,629,594 are described in depth. The primary innovations are partitioning of the systems into layers, and layers into independent superpositioned force functions (or in the case of geometrical entities, geometry elements).

Number Issued
5,822,438 Feb. 16, 1999 Whole Body Kinesthetic Display
Inventors: G. Roston

Claims cover a three dimensional treadmill or "foot haptic" device which allows free walking and running in any direction. The innovative technology disclosed includes how to make an electro-mechanical system with high strength and speed to weight ratio using electric motors and drives rather than electro-hydraulics. The architecture disclosed includes two independent mechanisms (for each foot) which operate in concert without collision to mirror the walking function. Control algorithms and how such a system connects into a distributed interactive simulation is described.

US Patents Pending

Number Filed (Continuation of 5,389,865)
09/185,301 Nov. 3, 1998 Force Feedback Systems
Examiner: P. Ip
Group Art Unit: 2837
Attorney Docket Code: cyb-00605/03
Inventors: C. Jacobus, A. Riggs, M. Taylor

Additional software method claims derived from 5,389,865.

Number Filed
08/859,137 May 20, 1997 Haptic Device Attribute Control
Examiner:
Group Art Unit: 2107
Attorney Docket Code: cyb-3102/03
Inventors: T. Peurach, D. Haanpaa, T. Yocum, C. Jacobus

Claims cover using GUI elements to parameterize haptic (force feedback) control elements (software or hardware). This is required to make a "feel" editor. The innovative idea is to attach directly manipulatable physical or virtual (on computer screen) attribute control objects to parts or parameters in a force feedback control system (for instance, an intensity control which changes the value of a vibration effect or a stiffness control which changes the elasticity of the surface repulsive effect). This work was derivative of Cybernet's first GUI based haptic demonstration interfaces.

Number Filed
08/859,877 May 21, 1997 Haptic Authoring
Examiner: W. Amsbury
Group Art Unit: 2771
Attorney Docket Code: cyb-03402/03
Inventors: T. Peurach, D. Haanpaa, T. Yocum, C. Jacobus

Claims cover the methods needed to author or create three dimensional object descriptions which include haptic (or force feedback) descriptions needed to simulate touching of the three dimensional objects (including a range of haptic texture methods). The innovative idea is the combination of methods needed to attach haptic parameters or specifications to effect and geometric object entities in an editing system such as a CAD/CAM system. Claims cover key requirements to combine graphical elements with haptic properties and how these combined entities are represented to drive a system such as that described in Haptic Browsing (above).

Number Filed
09/185,152 Nov. 3, 1998 Haptic Pointing Devices
Examiner:

Group Art Unit: 2837

Attorney Docket Code: cyb-04802

Inventors: Douglas Haanpaa, Gary Siebert, Terry Cussen, Kirk Fifer, Mike Dinsmore,
Charles Jacobus

Describes a very low cost three dimensional force feedback CAD/CAM/pointing device design which is supported by Cybernet software methods patents. Its uses are similar to the Phantom by Sensable, but is implemented using an innovative drive method which provides substantially better quality force feedback of virtual objects and haptic textures, and has a cost of goods below \$100.

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PATENT
REEL: 9570 FRAME: 0042

Force Feedback Physical and Design Assets

6 DOF Force Feedback Sticks	1
3 DOF Force Feedback Sticks	0
DDOFs (3DOF)	1
DDOFs (6DOF)	1
Pre-Production Yokes	
Functional (one on loan)	4
Form Compatible	2
Industrial Yoke	1
Industrial Wheel	1
SpacePen	1
Finger Forcer	1
Locomotion Simulator	1
Hardware Controllers for above	Multiple
Spare Parts	Multiple
Design and CAD databases for all above (On CD ROM)	

Force Feedback Software

Force Feedback SDK software (includes demos and 3D functions) 1
Force Feedback SDK Documentation 1

More detailed inventory to the module level is available from on-line databases

Marketing and Advertising Collaboration

Rights to Use Cybernet and CyberImpact trademarks in connection with Force feedback

Rights to iforce.com domain name registered currently by Cybernet

Links to Cybernet's web sites from Immersion and visa versa

All force feedback leads for commercial products and licensing

Includes Cybernet's Force feedback marketing and customer databases

Includes currently active potential licensee lists

Exhibit I


**ASSIGNMENT OF PATENTS AND PATENTS PENDING IN CONNECTION WITH
THE FORMATION OF A FULLY OWNED SUBSIDIARY OF CYBERNET SYSTEMS
CORPORATION NAMED CYBERNET HAPTIC SYSTEMS CORPORATION**

Per the attached BILL OF SALE AND ASSIGNMENT, Cybernet Systems Corporation, 727 Airport Blvd., Ann Arbor Michigan 48108, hereby assigns, sells, and sets over to Cybernet Haptic Systems Corporation, 727 Airport Blvd., Ann Arbor Michigan 48108, the entire right, title and interest in and to the US Patents and Patent Applications listed on Exhibit 2 following and Exhibit A of the BILL OF SALE AND ASSIGNMENT attached.

Assignor hereby agrees to execute any and all papers, including applications for letters patent of any and all kinds in any and all countries, and to perform any and all acts which assignee may deem necessary to secure thereto the rights herein assigned, sold, and set over.

Assignor further represents and warrants that it has not granted any rights inconsistent with the rights granted herein.

CYBERNET SYSTEMS CORPORATION

By: 
Charles J. Jacobus
President

Date: 2/22/99

Exhibit 2
LIST OF PATENTS

As In re application of
Method and System for Providing A Tactile
Virtual Reality and Manipulator Defining An
Interface Device Therefore

Attorney Docket No:

Issued: Feb 14, 1995

Assignee: Cybernet Systems Corporation

Patent No: 5,389,865

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

As In re application of
Method and System for Providing A Tactile
Virtual Reality and Manipulator Defining An
Interface Device Therefore

Attorney Docket No:

Issued: Oct 17, 1995

Assignee: Cybernet Systems Corporation

Patent No: 5,459,382

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

As In re application of
Force Feedback System

Attorney Docket No:

Issued: May 13, 1997

Assignee: Cybernet Systems Corporation

Patent No: 5,629,594

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

As In re application of
Gyrostabilized Platforms for Force
Feedback Application

Attorney Docket No:

Issued: May 19, 1998

Assignee: Cybernet Systems Corporation

Patent No: 5,754,023

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

As In re application of
Method and System for Simulating Medical
Procedures including Virtual Reality and
Control Method and System for use Therein

Attorney Docket No:

Issued: June 23, 1998

Assignee: Cybernet Systems Corporation

Patent No: 5,769,640

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

As In re application of
Force Feedback System

Attorney Docket No:

Issued: Nov. 3 1993

Assignee: Cybernet Systems Corporation

Patent No: 5,831,408

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

As In re application of
Haptic Browsing

Attorney Docket No:

Issued: Dec. 1, 1998

Assignee: Cybernet Systems Corporation

Patent No: 5,844,392

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

As In re application of
Whole Body Kinesthetic Display

Attorney Docket No:

Issued: Feb. 16, 1999

Assignee: Cybernet Systems Corporation

Patent No: 5,822,438

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

LIST OF PATENTS PENDING

As In re application of
Force Feedback Systems

Assignee: Cybernet Systems Corporation

Serial No.: 09/185,301

Filed: Nov. 3, 1998

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

Attorney Docket No:
cyb-00605/03

Examiner: P. Ip

Group No.: 2837

As In re application of
Haptic Device Attribute Control

Assignee: Cybernet Systems Corporation

Serial No.: 08/859,137

Filed: May 20, 1997

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

Attorney Docket No:
cyb-3102/03

Examiner:

Group No.: 2107

As In re application of
Haptic Authoring

Assignee: Cybernet Systems Corporation

Serial No.: 08/859,877

Filed: May 21, 1997

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

Attorney Docket No:
cyb-3102/03

Examiner: W. Amsbury

Group No.: 2771

As In re application of
Haptic Pointing Devices

Assignee: Cybernet Systems Corporation

Serial No.: 09/185,152

Filed: Nov. 3, 1998

Reassign to: Cybernet Haptic Systems Corporation
727 Airport Blvd.
Ann Arbor, Michigan 48108

Attorney Docket No:
cyb-04802

Examiner: W. Amsbury

Group No.: 2837